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DOE Meeting on ***BALANCING NATURAL GAS  
SUPPLY AND DEMAND***

**Natural Gas Supply Overview**

**December 19-20, 2005**

**Overview of Presentation**

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**BACKGROUND**

- **NPC North American Supply Outlook**
- **Supply Update – Actual vs NPC**

**KEY ISSUES**

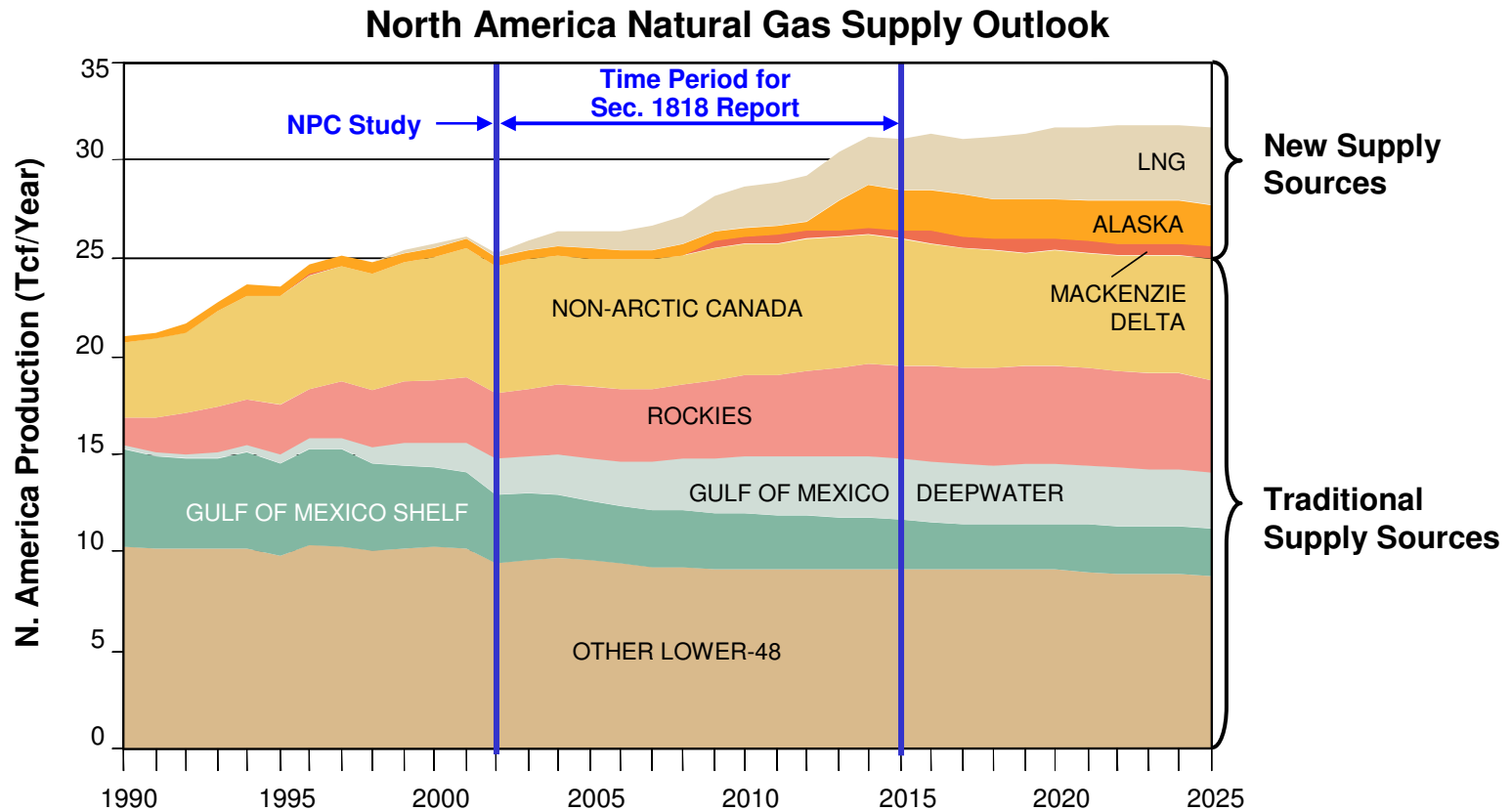
- **Gulf of Mexico**
- **Western Canadian Sedimentary Basin**
- **Non-Conventional Gas Basins**
- **Arctic Gas**
- **LNG Imports**
- **Access Considerations**
- **Technology Considerations**

**RECOMMENDATIONS & PROGRESS**

- **Key NPC Study Supply Recommendations**

## Natural Gas Supply Overview

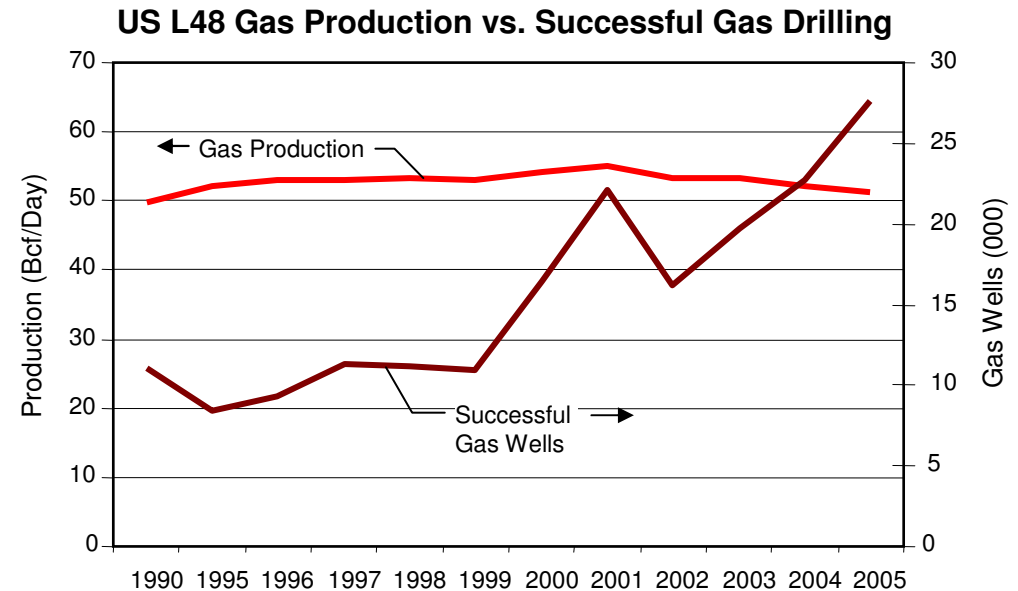
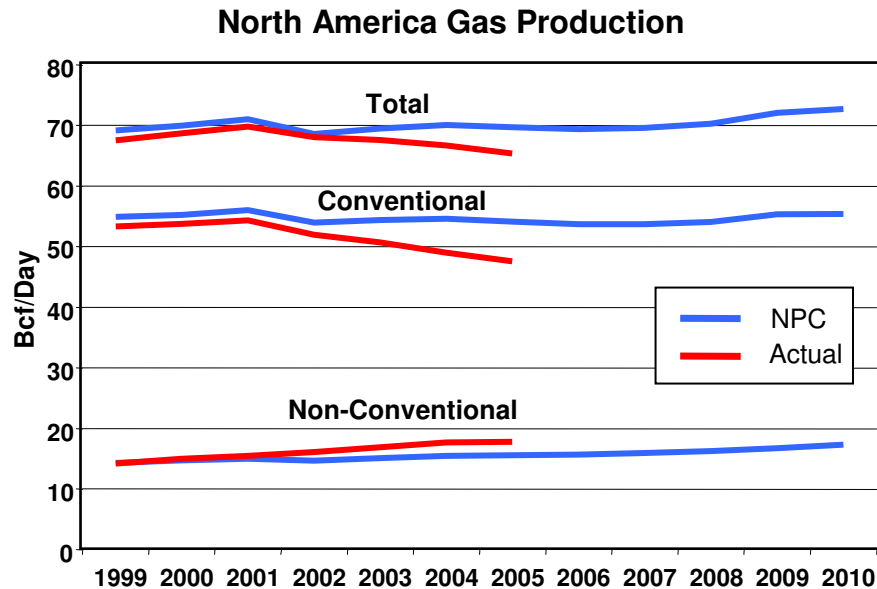
### North American Supply Outlook – NPC 2003 Study (Reactive Path)



- In the 1990's, natural gas production increased steadily to meet growing demand.
- After 2000, natural gas supplies became “tight” and have continued to “tighten”.
- Looking forward, traditional sources of gas supply are expected to remain essentially constant.
- LNG and Arctic natural gas will be essential for meeting future growth of demand.

## Natural Gas Supply Overview

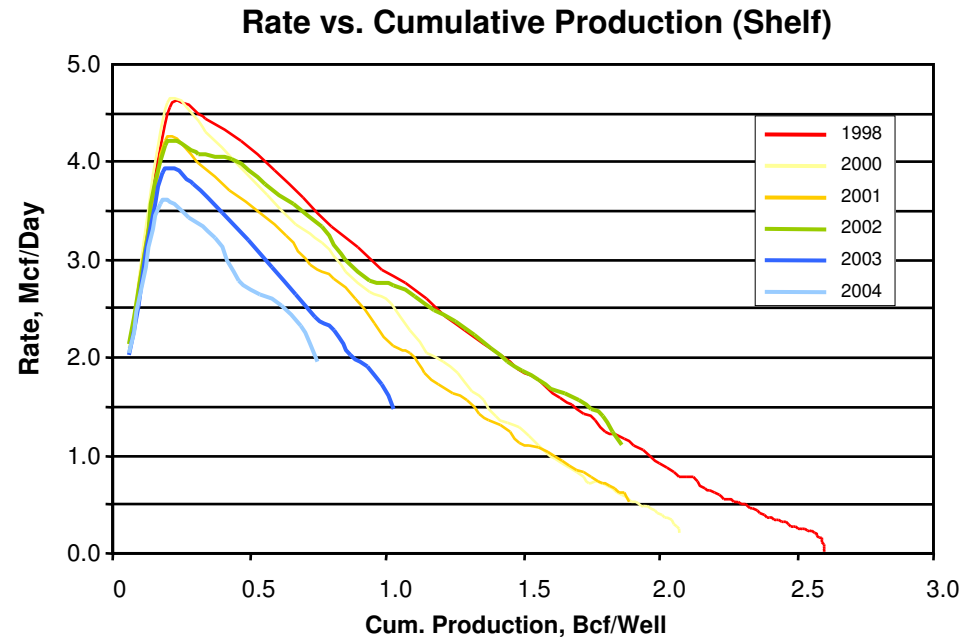
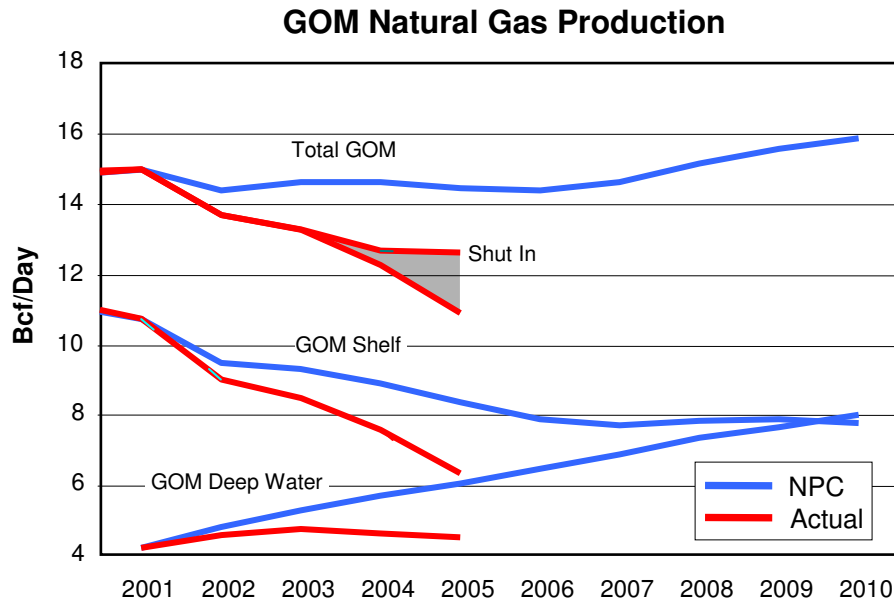
### Supply Update – Actual vs NPC Projections (Reactive Path)



- Conventional gas production had been declining, partially offset by non-conventional gas development.
- Production declines are most noticeable in offshore Gulf of Mexico (GOM) (Shelf and Deepwater) and Western Canada.
- Non-conventional gas production is higher due to increased drilling and new/expanded tight gas and gas shale plays.
- Natural gas drilling is at record levels; change in type of reserves added (higher R/P reserves) has limited production response.

## Natural Gas Supply Overview

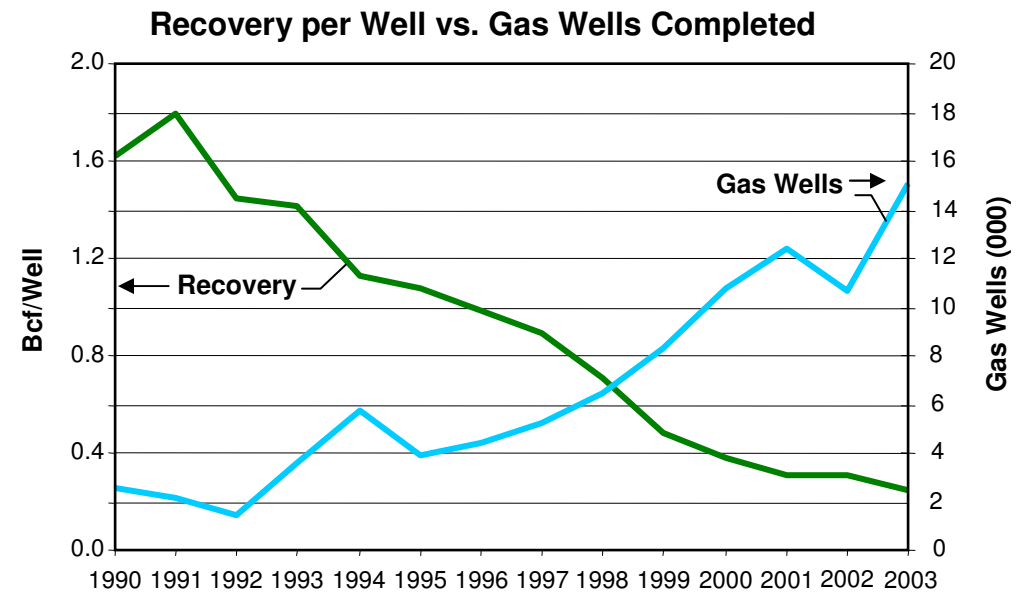
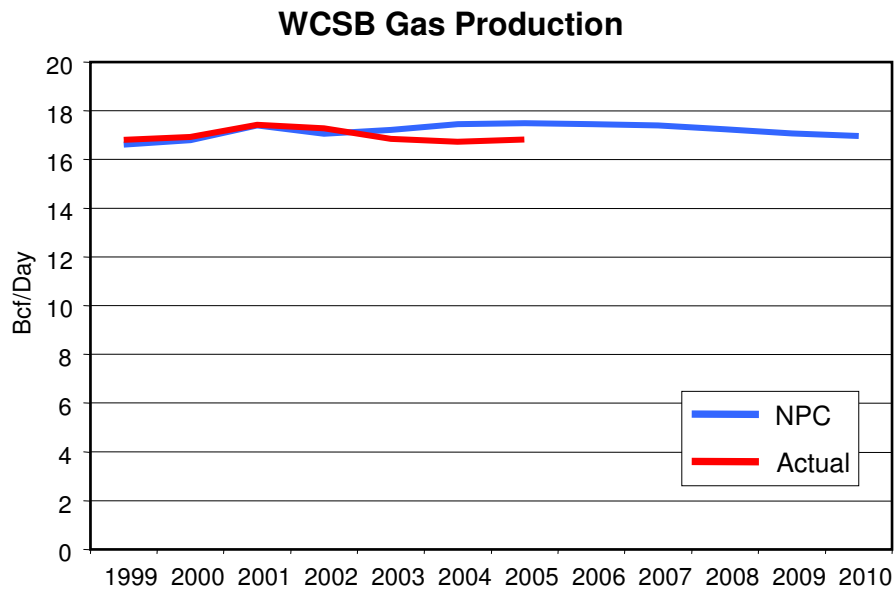
### Gulf of Mexico Basin (Shelf/Deepwater)



- **GOM shelf gas production has declined by nearly 2.6 Bcf/day, since 2001 (excluding effect of hurricanes); opportunities continue to become smaller; hurricanes reduced gas production by an additional 1.7 Bcf/day in 2005.**
- **Deepwater projects are delayed and less gas prone than expected.**
- **Sustaining GOM production will be challenging given recent disappointing exploration results.**

## Natural Gas Supply Overview

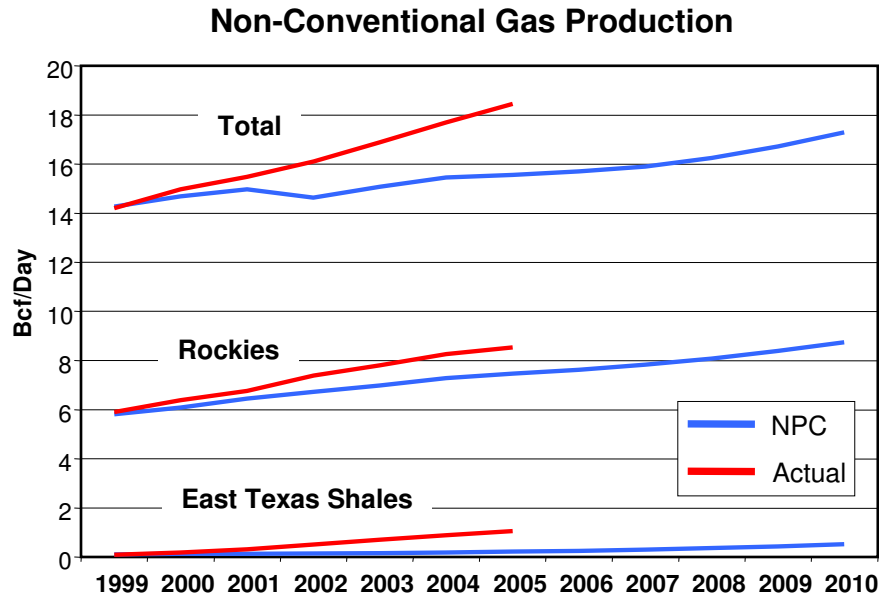
### Western Canada Sedimentary Basin (WCSB)



- **WCSB gas production has fallen below NPC expectations, despite record gas well drilling.**
- **Well productivity continues its long-term decline, dominated by shallow in-fill drilling.**
- **Non-conventional gas supplies are less developed than in the US; industry is beginning to develop CBM, consistent with NPC expectations.**

## Natural Gas Supply Overview

### Non-Conventional Basins



**U.S. Natural Gas Well Drilling**

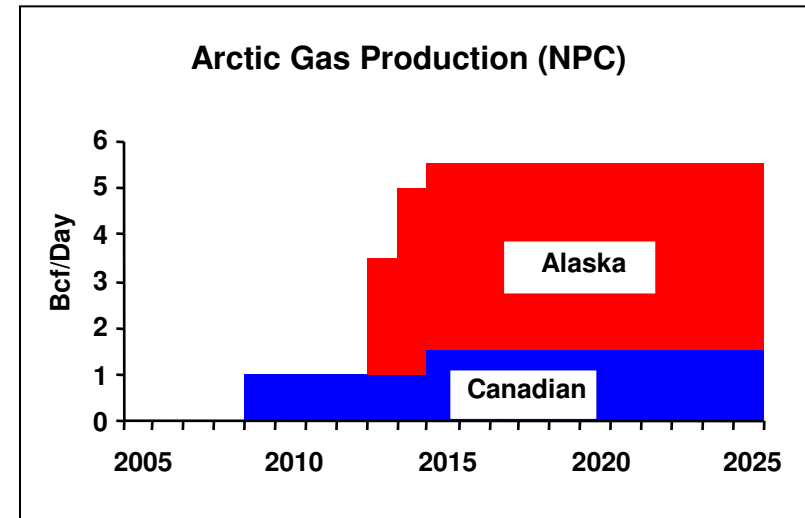
	Total Gas Wells	Actual Unconventional Gas Wells	NPC Unconventional Gas Wells*
	(Wells/Yr)	(Wells/Yr)	(Wells/Yr)
2001	22,100	12,700	10,600
2002	16,200	11,900	9,900
2003	19,700	13,400	9,400
2004	22,700	14,100	9,200

\*Includes "low perm conventional"

- Non-conventional gas is being intensely developed with activity levels above NPC expectations.
- Resource base for certain gas shale and tight gas basins may be higher than in NPC assessments.
- CBM development is in-line with NPC expectations; permitting constraints are limiting pace of drilling.

## Natural Gas Supply Overview

### Arctic Gas



#### Mackenzie Gas Project

- NPC Assumptions - - 2009 start-up at 1 Bcf/d; expansion to 1.5 Bcf/d in 2015
- Outlook - - Project scope consistent; start-up timing likely delayed by 2 years

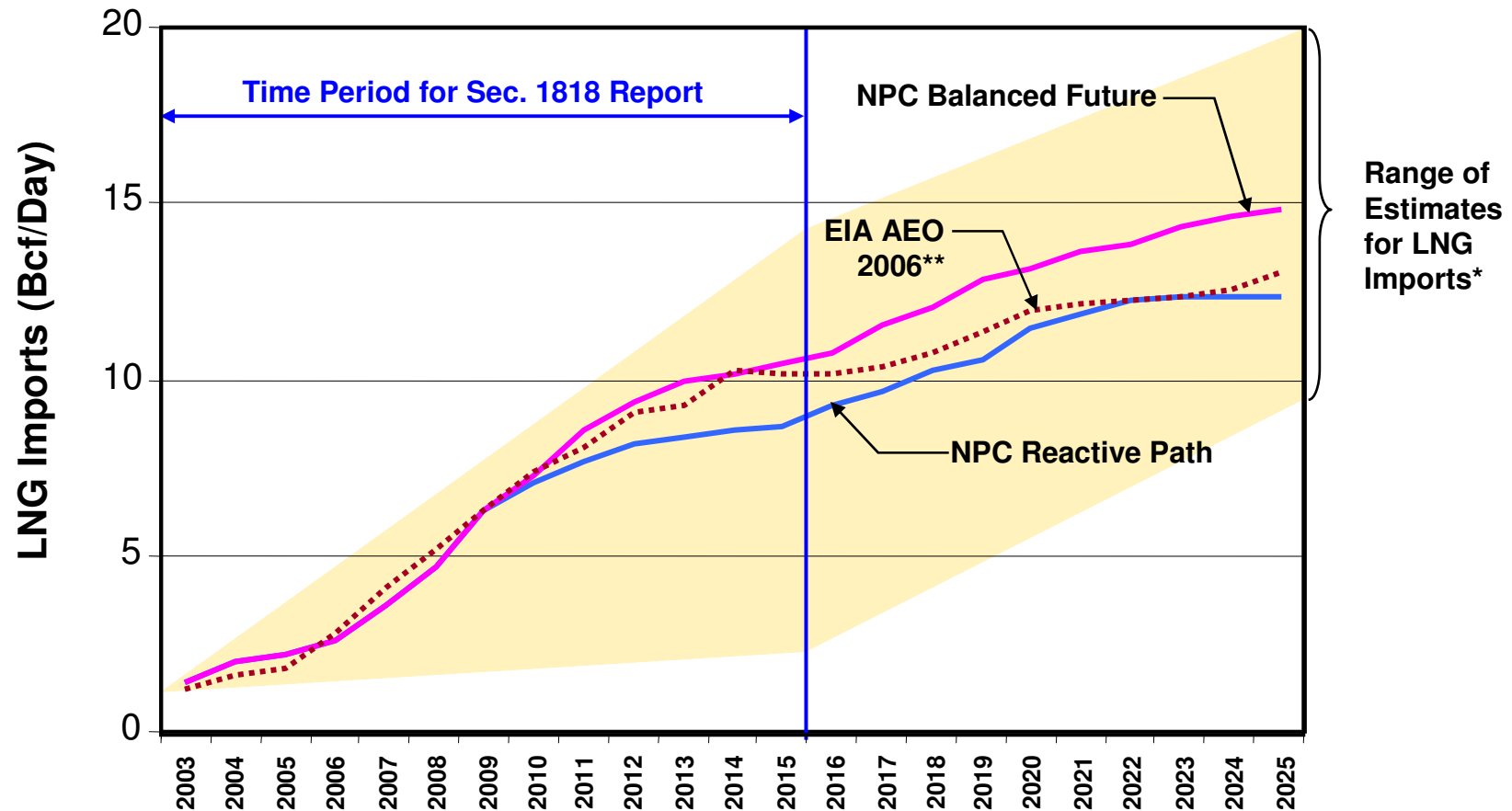
#### Alaska Gas Pipeline

- NPC Assumptions - - 2013 start-up at 2.5 Bcf/d; full volume of 4 Bcf/d in 2014
- Outlook - - Project scope consistent; start-up timing likely 1-2 years later



## Natural Gas Supply Overview

### LNG Imports



\*Source: EIA AEO 2005.

\*\*Includes LNG plants at Altamira and Baja in Mexico.

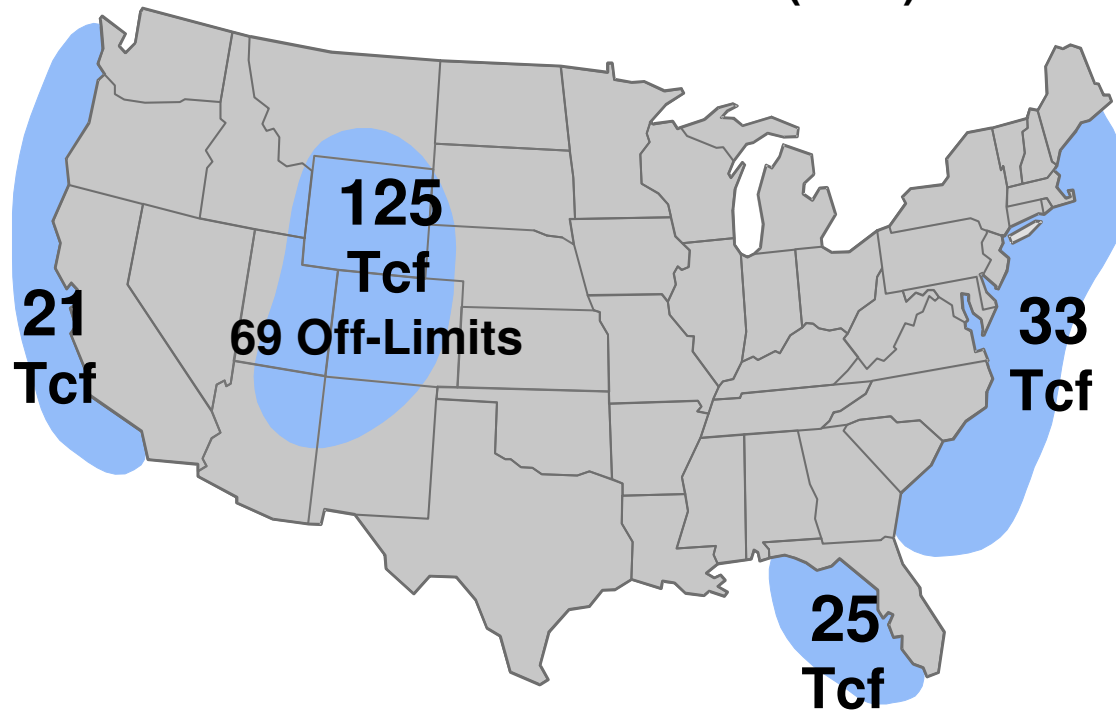
- Recent LNG terminal expansions and developments are in line with NPC expectations.
- Considerable differences exist on the longer-term outlook for LNG imports.

## Natural Gas Supply Overview

### Access Considerations

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#### Natural Gas Resources Impacted by Access Restrictions (NPC)



- Studies are underway to update access restrictions and resources impacted.
- Pace of permitting has slowed development in the Rockies, particularly for Powder River CBM.

## Natural Gas Supply Overview

### Technology Progress

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**Technology Progress “Levers”**  
(% Annual Improvement)

	<b>NPC Study*</b>	<b>AEO 2006</b>
<b>Drilling Efficiency</b>	1.81%	0.89%
<b>EUR/Well (Technology Effect)</b>		
• <b>New Field Discoveries (Onshore)</b>	0.87%	0%
• <b>Unconventional Gas Wells</b>	0.87%	0%/0.25%**
<b>Operating Efficiency</b>	1.00%	0.52%

\*Average parameters.

\*\*0% for mature gas plays; 0.25% for immature gas plays.

- **For two decades, progress in natural gas E&P technology countered the effects of resource maturity and depletion.**
- **For the past several years, the pace of technology progress in natural gas E&P technology appears to have slowed.**
- **The decline in technology progress is reflected in reductions in the “technology levers” used in recent EIA gas supply models, compared to those used by the NPC Study.**

## **Key NPC Study Supply Recommendations**

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### **Increase Supply Diversity**

- **Increase Access and Reduce Permitting Impediments to Development of Lower-48 Natural Gas Resources**
  - + Administration efforts to expedite lease sales and permitting (NGOs in opposition)
  - Implementation in state/field offices limited by lack of resources
  - Lack of progress on access to OCS
- **Enact Enabling Legislation for an Alaska Gas Pipeline**
  - + Alaska Natural Gas Pipeline Act enacted (October, 2004)
  - + State of Alaska negotiations with ANS producers are well advanced
- **Process LNG Project Permit Applications within 1 Year**
  - + FERC demonstrating progress toward permitting efficiency
  - + Center for LNG (CLNG) has provided LNG education and advocacy
  - + EAct gives FERC primary authority for LNG terminals
- **Evaluate the appropriateness of funding levels for natural supply R&D**
  - + EAct authorizes R&D program for ultra-deep and unconventional gas resources, plus marginal wells and methane hydrates.

**Policy recommendations in NPC Study remain sound, important and timely.**  
***Should more robust recommendations be pursued?***

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